

CHAPTER I

INTRODUCTION

1.1 Background

Globalization continues to move in a global society with the presence of information technology and communication technology (Sudarsana, Nakayanti, Sapta, & Satria, 2019). The existence of those technology has made changes in all aspects of community life both in the socio-cultural field in facilitating communication and increasing the dissemination of information (Uzelac, 2008). And in the field of education that develops following technological advances in the learning process to improve the quality of education (Sudarsana et al., 2019). Therefore, a certain set of skills is needed to be a productive and active member of society in facing the 21st century challenges (Li, Lemieux, Vandermeiden, & Nathoo, 2013).

21st Century expertise enables society, especially the young generation, to face challenges of globalization (Soh, Arsad, & Osman, 2010). A fundamental skill in the 21st century is computational thinking, which includes teamwork and collaboration skills, critical thinking skills, and problem-solving skills (Barrington, L., Casner-Lotto, J., & Wright, M, 2006). Computational thinking is a way to find solutions in separate problems into parts that are grouped into reasons, principles, and functions (Kafai & Burke, 2015). Besides, computational thinking might imply computer use, but it is a combination of disciplined mental habits, endurance attitudes, and important soft skills (Park, Kim, Kim, & Yi, 2019).

Computational thinking allows to not only consume technology, but also to create with technology (Yadav, Hong, & Stephenson, 2016). Computational thinking is a prerequisite skill for understanding future technology. It is a thought process, not a specific collection of knowledge about a device or language (Sudarsana et al., 2019). Computational thinking is often associated with computer, but it's important to note that it can be taught without tools. It has emerged as an essential skill for colleges and careers, teaching students how to program, question, and manage digital devices has become common place in the schools (Yadav et al., 2011).

Before students can effectively perform these challenges, students must

understand the concepts behind applying 21st-century skills. Therefore computational thinking can be a part of any classroom, and it quickly becomes a fundamental skill required for students (Papadakis & Kalogiannakis, 2017). By teaches explicitly and providing room for developing computational thinking. Teachers can ensure that students learn to think in ways that enable them to access and understand their digital world (Von & Dabbish, 2008).

In short, teaching computational thinking to be the key of students for future success. In the education aspect, computational thinking has the potential to integrate the way students approach the problem, with technology on problem-solving (Yadav et al., 2011). The integration of technology in students' lives has various uses, such as for doing homework (Yılmaz & Orhan, 2010). Besides that, technology also integrated into the learning curriculum (Wallace, 2004). With the integration of technology in the curriculum, learning activity should also use technology. One of technology-based learning is the use of online learning platforms as learning media in the learning process (Khan, Ahmad, & Malik, 2017).

The students' interest from the increasing of technology mostly in terms of playing games (Liu, Rosenblum, Horton, & Kang, 2014). Given the implicit belief that games are enjoyable (Von & Dabbish, 2008). Many instructors have integrated gamification into the classroom as learning media (e.g., Mekler, Brühlmann, Tuch, & Opwis, 2017). So, the teacher can conduct a game-based approach in the classroom to support student's interest in a learning activity with the use of technology as learning media (Lin, Mokhtar, & Wang, 2015). The use of gamification classroom shows positive effects on developing students' critical thinking, teamwork capabilities, and interest in the subject matter that they learn in school, and quite effectively changing their attitudes (Khan, Ahmad, & Malik, 2017). To create a successful gamification classroom, the user is required to engage with the game fully, while also learning the educational material embedded in it. Even the concept seems simple enough, the actual design should raise the interest of both the student and the teacher in the learning activity (Park, Kim, Kim, & Yi, 2019).

Moreover, the importance of computational thinking as a goal of science education is increasingly acknowledged (Swanson, Anton, Bain, Horn, &

Wilensky, 2019). Teaching computational thinking in the context of science not only presents students with a more authentic image of science as it is practiced today, but it also increases access to powerful modes of thinking and skills for many careers (Von & Dabbish, 2008). Also, the respiratory system's material has many problems that must be solved appropriately. One of them is to overcome various types of diseases that arise due to the lack of human awareness in the importance of maintaining health (Golczewski, 2007). Therefore, the ability to solve problems is considered necessary for students to support their lives (Incebacak, 2016). One example of the issues that often occur due to the lack of human awareness, in the importance of maintaining health is the dangers arising from smoking, so it is necessary to find a solution to reduce the number of smokers in Indonesia (Prasetyoputra, 2014).

From the explanation above, this research focuses on the use of gamification classroom on students' computational thinking skills. The science topic raised in this study is the topic of the respiratory system. This topic was chosen because it was considered dull by the students (Fauzi & Mitalestani, 2018). Besides that, to understand this topic the students should define all parts of the respiratory organ, connect the structure of the organ with its function, and explain the concepts applied in the respiratory system (Golczewski, 2007). These tasks include a lot of information, so that requires students to solve problems between each information. Thus, this topic is considered to be able to develop students' computational thinking skills and will be more interesting through the gamification classroom.

1.2 Research Problem

Based on the background stated, the research problem for this study is “How is Gamification Classroom for Enhancing Students' Computational Thinking Skills in Learning Respiratory System?”

1.3 Research Question

Based on the research problem above, the research attempts to explore the research question and there are:

- 1) How is the implementation of the gamification classroom by using Classcraft application in learning respiratory system?
- 2) Does the gamification classroom by using Classcraft application enhance

students' computational thinking skills significantly?

- 3) What are strands of computational thinking that are enhanced after the implementation of the gamification classroom using Classcraft application in learning respiratory system?
- 4) What are students' impressions about using Classcraft application in the respiratory system topic?

1.4 Limitation of Research

The research also has a limitation, to make research more detailed, the limitation of the research are:

- 1) Gamification Classroom

The Gamification classroom conducted depends on the aspect of gamification, which are instructional content, game characteristics, behavior/attitude, and learning outcomes. In contrast, gamification effects on learning are a combination of disciplined mental habits and essential soft skills. Classcraft, as the application used in this research focused on creating a fun and collaborative learning experience, that has a positive impact on student motivation and involvement, academic performance, attendance, and classroom culture.

- 2) Student's computational thinking

Student's computational thinking in this research is limited to the taxonomy that consists of strands of computational thinking practice, which are: Decomposition, Pattern Recognition, Abstraction, and Algorithms.

- 3) Respiratory system topic-subtopic

The topic in this research is the respiratory system topic limited by core competence 3 and 4 and basic competence 3.9 and 4.9 that are attached in the 2013 national curriculum of Indonesia in Junior High School.

1.5 Research Objective

- 1) To investigate the student's computational thinking enhancement after learning respiratory system topic by using Classcraft application as a gamification tool
- 2) To analyze student impression about Classcraft application as gamification tool on respiratory system topic

1.6 Research Benefit

The result of this study is expected to provide the following benefits below:

- 1) For students, with the existence of this research, the students can feel the new experience in a fun and meaningful learning process by using Classcraft application as a gamification tool.
- 2) For a teacher, this research about how gamification classroom for enhancing student's computational thinking skills in respiratory system topics. Get an overview about the conditions of student's computational thinking skills, knowing how is the implementation of gamification classroom by using Classcraft application in the learning process as a teaching strategy.
- 3) Another researcher, this research can be used as a reference. It can be one way to develop another research in the future, especially in managing the class by using gamification. The resulting strength and weaknesses.

1.7 The Organization of Research Paper

In order to make the research is structured systematically, this research arranged based on the research arrangement explained below:

- 1) Chapter I : Introduction

This chapter consist of the research background, research problem, research question, research objectives, research benefit, and the organization of research paper. Chapter I is the foundation of this research.

- 2) Chapter II : Literature Review

This chapter elaborate the more details about theories of the research, that used in this reseach. The theories in this research includes gamification classroom, computational thinking skills, classcraft application, and respiratory system topic.

- 3) Chapter III : Reseach Methodology

This chapter explains about the research method and research design that used in this research, subject of the research including the population and the sample, operational definition, hypothesis, assumption, and instrument that was used in conducting the research, data analysis and the research procedure

- 4) Chapter IV : Result and Discussion

This chapter consist of the data collected as the results of the research, and reseach discussion of the data collected. The author analysed the data gained

according to the research questions that has been determined before conducting the research.

- 5) Chapter V : Conclusion and Recommendation This chapter consists of the conclusion based on the collected data that has been analysed in the previous chapter. This chapter also shows the recommendation from the author that can be used by the teachers, or another researcher for the further research.